THE VALUE OF THE X-RAY IN SURGERY.

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As the value of the application of the X-ray in surgery and medicine seems to engage the attention of the profession, and a variety of opinions are entertained as to its true character and proper results, I desire in this communication to describe and illustrate certain cases which are both interesting and important. In these actual cases the surgeon's responsibility was serious, and grave consequences would have resulted from errors in diagnosis. The X-ray proved to be the best means of diagnosis in these cases, and with the latest accessories gives us a method for the photography of the invisible which is absolutely reliable and indispensable for securing accurate skiagraphs, entirely eliminating the elements of distortion. Very early in the history of the X-ray, it was found that we had to deal only with the shadow, with all the limitations which the term implies. The disappointments which followed its application in many cases were due to the lack of proper technique, knowledge of the apparatus, and management of each given case. As long as it is borne in mind that we are dealing with a shadow not only treacherous, but which may be easily exaggerated or changed by position, surgeons will always try to have the proper proof that the subject was placed in a certain definite position, and not only one but more skiagraphs will be taken from different points in each case, and the injured part will be compared with the normal one, if the most useful record of our procedure before, during, and after the treatment of our cases is to be secured. All this may be done through the dressings of the injured part, without any pain or discomfort to the patient; through plaster of Paris,

through the clothes, regardless of any swelling or inflammation which may mask the real condition, and without general anæsthesia. How often is the operation really of secondary importance as compared with the dangers of anæsthesia? The foreign body is found without the dangerous probe, the dislocation or fracture diagnosed correctly without the painful manipulation, the growth of the callus may be observed, the approximation of the fragments may be seen, fissure fracture recognized, and in diseases of the bones the real cause may be found.

In illustration of the value of the X-ray in diagnosis, I submit the following cases:

CASE I.—*Injury at Hip, demonstrated after Five Years of Treatment for Coxalgia to be One of Dislocation of Head of Femur.*—Miss A. R., aged eighteen years. Some years ago, always being in good health, she slipped on the steps of her house. She did not mind it very much at first, suffering pain, but not very badly. In a few days the pain became aggravated and a physician was called, who diagnosed the condition as one of coxalgia, and treated it accordingly. Now, after the lapse of five years, the girl's health being excellent, there is a shortening of the limb of two-and-a-half inches. An X-ray examination demonstrated the existence of a dislocation of the head of the femur, and absolutely no disease of the bones. (See Fig. 1.) This skiagraph shows the details plainly and the internal structures of the bones. The negative is still better.

In X-ray work, by proper technique and patience, unexpected results are sometimes obtained. It is not the machine or the tube which are always to blame, but sometimes ourselves. In the following case I had made five long exposures, and the results were always negative. Then I changed my procedure, remembering that the subject to be photographed must be as near as possible to the plate. Instead of minutes of exposures, I made it seconds, and succeeded. It is very hard to find always the necessary length of exposure, each individual case being different; if the exposure is prolonged, the negative will

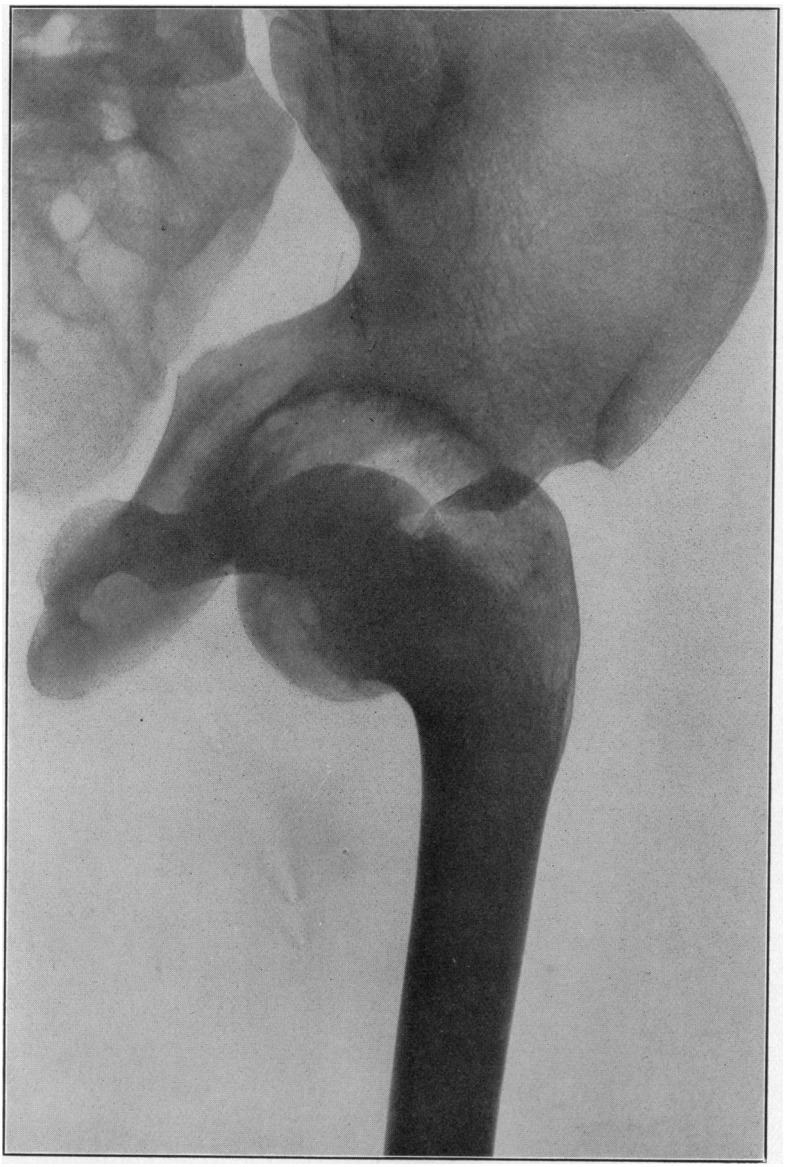

FIG. 1.—Shadows and substance of the bones; dislocation of the head of femur; no disease of the bones.

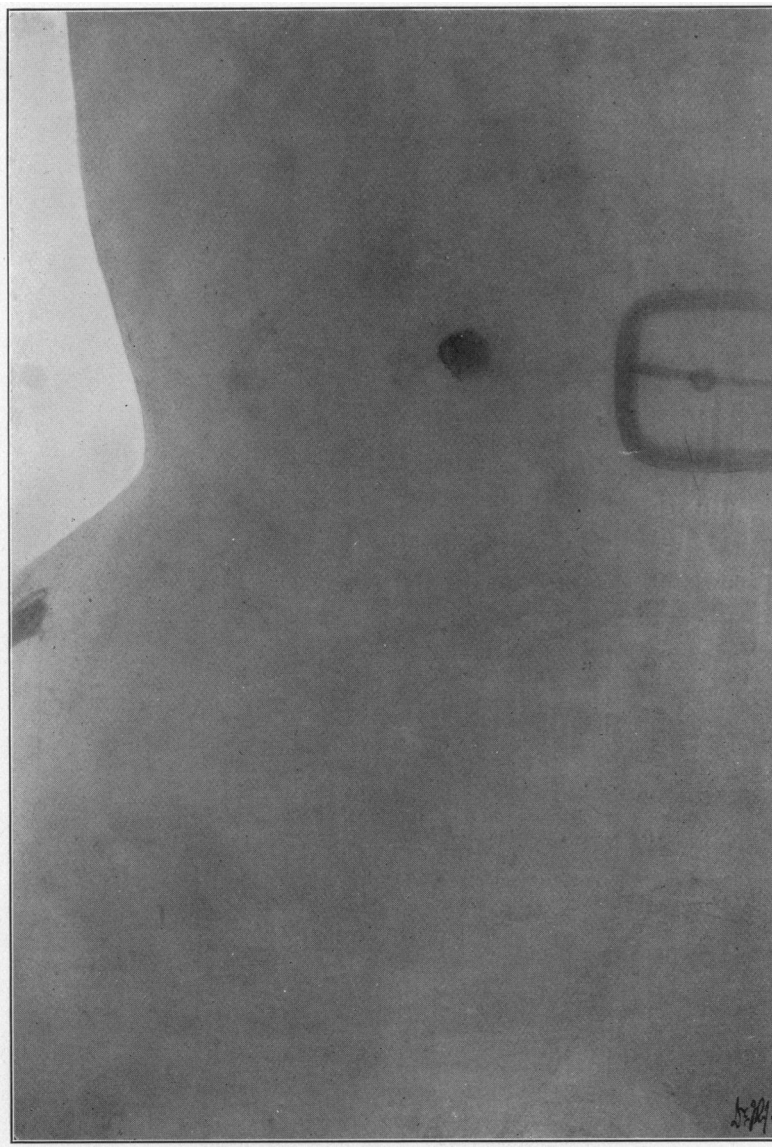

FIG. 2.—Showing two gall-stones,—one oval, the other elliptical.

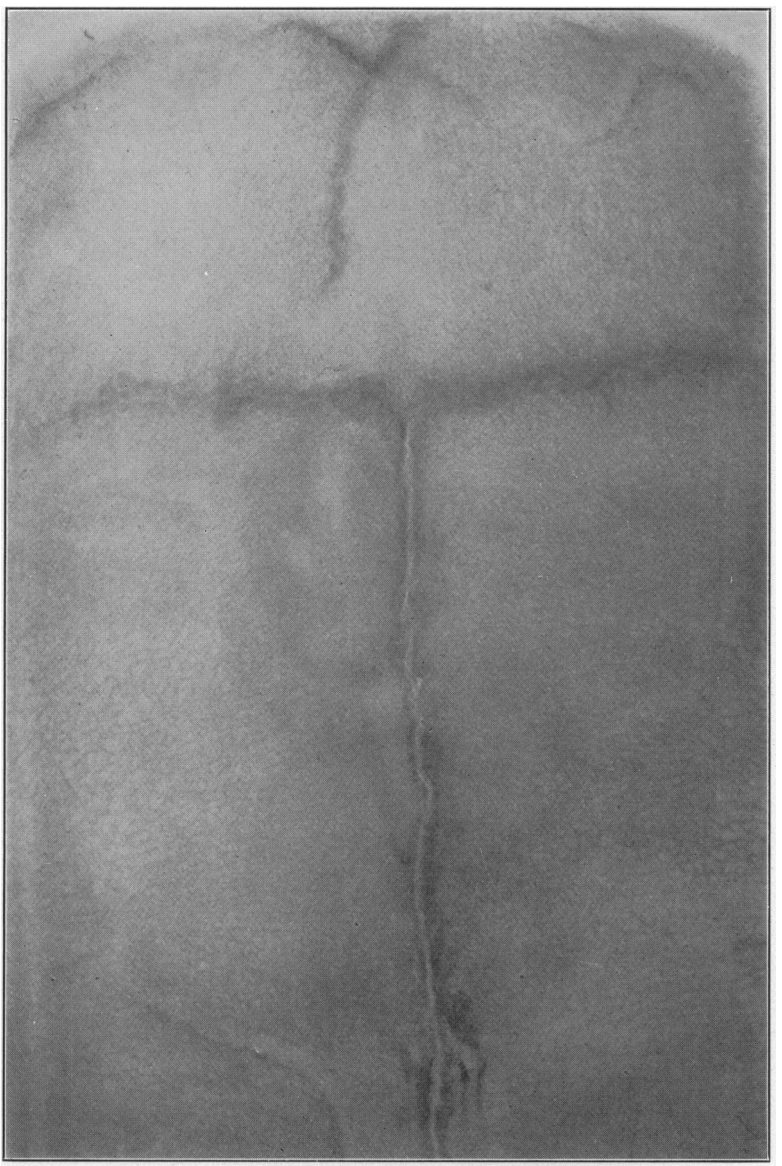

FIG. 3.—Clot under the parietal bone at the sagittal suture on the left.

be foggy; if one does not expose quite long enough, the result may be negative.

CASE II.—Mrs. A. M., aged thirty-four years, with a history of acute attacks of cholecystitis, with marked jaundice. Case diagnosed in the beginning as appendicitis; later on carcinoma of the liver; and, finally, as simple jaundice. She was submitted to X-ray examination for gall-stones. Temperature at this time was 100° F.; pulse, 120; weight, 101 pounds; height, five feet one inch. Very thin. Five exposures negative. The sixth one in fifty seconds, at forty-two degrees, tube being two-and-a-half feet from the body, and the plate right under, revealed two gall-stones, one oval and the other one elliptical in form. The case was operated on a week later, and the diagnosis verified by the removal of the two gall-stones. The round one contained phosphates only, the other one had a nucleus of cholesterine with phosphates around. (See Fig. 2.) The skiagraph of the right side of the body shows the outline of the ribs, vertebræ, and pelvis. The negative is also better in this case.

In the following case the symptoms were obscure and pointed to a non-operative line of treatment, but the X-ray proved the necessity for operation.

CASE III.—J. F. B., aged thirty-nine years; sunstroke six years ago. Since that time had complained of dull, persistent headache on the left side of the head; changed disposition, was irritable, had vertigo, dyspepsia, vomiting, soon followed by slight palsies, but no convulsions. Lately, retention of urine and symptoms more obscure. The tone of the muscles and intellection were unimpaired. With the parts of the head not examined covered with stanniol and those exposed oiled for protection, the X-ray revealed under the parietal bone at the sagittal suture on the left a large epidural clot. (See Fig. 3.) The clot, amounting to four ounces, was removed, and recovery followed in three weeks, without any complication.

The following case was diagnosed as primary lateral sclerosis, acute myelitis, and, finally, spinal meningitis, until its true nature was demonstrated by the X-ray.

CASE IV.—B. P., aged twelve years. Very gradually developed increasing feeling of weakness in his limbs and some stiffness of the muscles. Occasionally there occurred brief flexor spasms, drawing the legs up. The knee-jerk was greatly exaggerated. Sensation unaffected. As the morbid process progressed, a curvature of the spine resulted in a few years. Electro-contractility not impaired. The real condition not being recognized early, the treatment was most unsuccessful. On X-ray examination, destruction of the bony substance of the vertebræ was demonstrated instead of disease of the lateral white columns or anterior horn of the cord. The changes, being tubercular without doubt (see Fig. 4), were marked most beautifully not only in the bodies of the vertebræ, but in the processes also. It may be that interstitial hyperplasia of the connective tissue and the atrophy of the nerve elements were present too, but the real cause was found in the bones, a condition of affairs which could not be made out by another means of diagnosis. So far I have not yet seen a picture so clear and good as this one is.

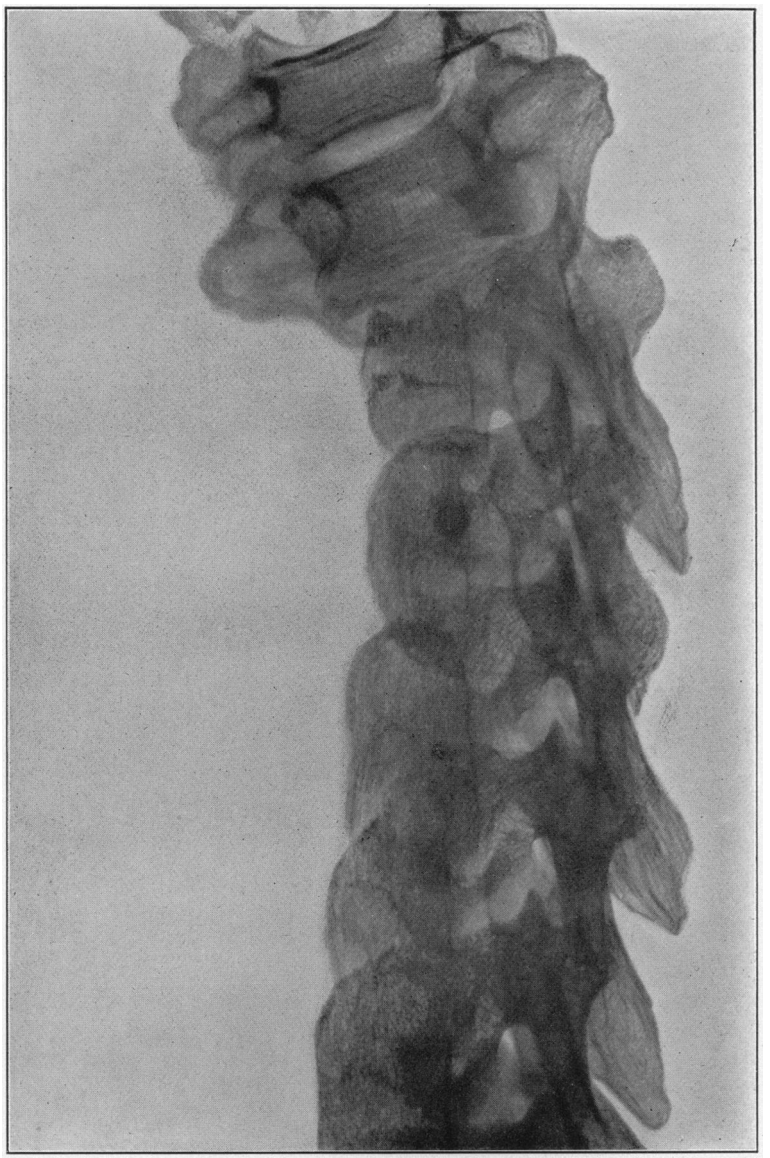

FIG. 4.—Destruction of the vertebræ and processes, tubercular and curvature.